# COMMUNICATING VALUE IN SOCIAL IMPACT BONDS: THE ROLE OF THE INTERMEDIARY

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ABSTRACT

*This paper examines the role of intermediaries in Social Impact Bond financing agreements. Social Impact Bonds are a financial innovation designed to save public entities money and promote social good by funding preventative social services with private capital. To date, Social Impact Bonds in the U.S. have utilized private sector intermediaries to structure contracts, manage service providers, and ultimately to mitigate financial risk.*

*In this paper I present the context and progress of Social Impact Bonds in the U.S. and use financial analysis to estimate value from the investor's perspective in the Rikers Island Social Impact Bond. I then discuss the ability of intermediaries to affect and communicate value to investors.*

*I found that intermediaries are intrinsic to the success of Social Impact Bonds. This paper anticipates their effect on the mode and scope of Social Impact Bond proliferation by exploring their role in the assessment of risk and value.*

# BIOGRAPHICAL SKETCH

Tarek Omar Haffar earned a Bachelor of Science from the University of California at San Diego and a Master of Arts from Cornell University.

All of my achievements are dedicated to my brother. May he exceed them!

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# INTRODUCTION

Social Impact Bonds (SIBs) are transforming the way regional governments provide social services. They may soon challenge the role of public policy in maintaining social goods and remedying fiscal inefficiencies. It is imperative that scholars and professionals work toward a more transparent description of this innovative and elaborate financing framework.

There remains some uncertainty about the value of impact bonds beyond financial returns and it is unclear how enduring the social impacts will be, however the impact bond framework is gaining popularity around the United States despite any doubt of their efficacy. There is now a presence of impact bond development or legislative support for Pay for Success (PFS) projects in at least fifteen states and considerable support from the federal government (Shah and Costa 2013). Prominent financiers and philanthropists are funding projects for public agencies in urban areas around the country. It is worth discussing the purpose that these financial innovations aim to serve and the way in which they will proceed; the services they will implement and the structure of the agreements. An essential element of the SIB model is the transfer of risk from the public to the private sector. This feature is also the key obstacle to attracting for-profit private investment in SIB schemes (Warner 2013). It is the mission of the project intermediary to communicate this transfer effectively between the public and private participants.

In this paper I discuss the role of the project intermediary within the impact bond framework and its purpose as an essential addition to the pay for success

financing mechanism. I summarize a few examples of Social Impact Bonds being developed in the United States and describe the social service needs they aim to fulfill. I emphasize the intermediary's role in part by analyzing the real option apparent in the Rikers Island Social Impact Bond. I then show the effect of changes in the discount rate as well as suggest caution against the standardization of SIB valuation across heterogeneous regions. Finally, I introduce a conceptual framework that describes the dominance of the Impact Bond structure over a conventional financing scheme, concluding with a discussion about the intermediary's role in securitization of SIBs and the implication of financialization in local governments and regional economies.

Until now, the importance of intermediaries has not been highlighted in the context of Social Impact Bonds. It has, however, been the subject of some debate in the financialization of regional economies (van der Zwan 2013). Financialization is the process by which profit-making occurs through financial channels and transfers rather than trade and commodity production (Krippner 2005). It is apparent that mismanagement of such activity can be the cause of inter-regional crisis itself, and in the wake of one of the worst financial crises in history economic geographers are inclined to include attention to financial innovations and intermediaries in their work. Amidst the economic turmoil of recent years, there is an opportunity here to revisit the concept of social value and address public finance alongside financialization in the context of economic geography and urban policy (Sokol 2013).

### *Impact Investing and Public-Private Partnership*

Given the precarious condition of regional economies, local governments are searching for innovative ways to provide public goods efficiently without adding to laden government budgets or increasing taxes. The nearly ubiquitous need for flexibility in social service and infrastructure finance has spurred the development of public-private financing schemes purposed for environmental and social initiatives (Brinkerhoff 2011). In general, these partnerships have been categorized as public-private partnerships and are considered an innovative solution to society's most pressing problems (Bryson et al. 2006). One evolution of a cross-sector partnership designed to scale proven preventative social programs is called Social Impact Bonds (SIB) (Palandjian 2012).

A SIB is an investment vehicle that appeals to impact investors who aim to affect social and environmental improvement with private financing. Impact investments in general are commonly defined as investments that are intended to create positive impacts beyond financial returns (J.P. Morgan and Rockefeller Foundation 2010). The challenge for a SIB project is to provide a return such that commercial investors are willing to finance projects with positive impacts but relatively uncertain cash flow; moreover, in the case of a SIB, these mechanisms are expected to attract up-front investment in social service projects that are completely dependent on impact-based success payments. Success payment schedules should reflect a reliable social impact assessment tailored to regional socioeconomic dynamics. Projects of this complexity require an innovative financing structure.

Impact Investments are expected to improve the quality of social services by incentivizing the market-based quality and competitive pricing of the profit-seeking private sector. These expectations are being tested in various ways around the world, the preeminent mechanism implemented in the United States being the Social Impact Bond. In the context of constrained government budgets and economic uncertainty, the SIB is touted as an innovative public-private partnership that allows private investors to enable local governments to launch preventative social services projects with performance-contingent repayment.

Public-private partnership in infrastructure development has a rich history in the U.S. and numerous case studies from around the world (Hodge and Greeve 2005), but public-private cooperation as a means of impact investing is relatively new in practice. With active investments in pay for success-based Impact Bonds around the country, and an interested public sector supporting legislation in a number of states, it seems that the structure and efficacy of these contracts deserve additional attention as they become useful in public project financing. In this paper, I focus specifically on pay for success contract-based Social Impact Bonds designed to finance preventative public services.

***The Social Impact Bond***

The purpose of a Social Impact Bond is to encourage commercial investors to provide up-front funding for public service projects with an impact-based repayment agreement. To accomplish this task, the structure of an impact bond monetizes social

service output by explicitly valuing outcomes and requiring overall success of a project (Hughes and Sherer 2014).

A Pay for Success (PFS) contract states the terms of agreement and the expected value of a SIB project's success. It also outlines a repayment schedule based on impacts associated with government savings and is typically held between the intermediary and a public agency. The defining feature of these contracts is the requirement of project success before the repayment of the initial investment. If the project is successful in creating the agreed upon outcome, investors will be paid success payments proportional to realized savings and impact expectations.
The SIB investment mechanism is built around a Pay for Success Contract and provides preventative social services by incorporating an intermediary to consolidate input from investors, government, and service providers.

The advantage of a SIB is its ability to support the assessment, funding, and implementation of a preventative service that improves social welfare. The preventative service is a direct benefit to the treatment group and produces savings for the government which are then passed through an intermediary to repay investors. As a system, a SIB represents a comprehensive investment and management agreement that utilizes an outcome-based repayment mechanism designed for a specific application of preventative services with measurable impact.

Another form of Impact Bond, Development Impact Bonds (DIBs), combines the structure of a SIB and Cash on Delivery Aid, an outcome-based approach to improving the quality and transparency of development funding projects. A DIB

agreement would use development funds to leverage the efficiency of the private sector by guaranteeing success payments for a development project. Whereas a SIB makes success payments primarily from transfers of budgeted monies of the government, a DIB would pay for success with capital that would otherwise be distributed as aid. The purpose of redirecting aid capital to private service providers is to ensure quality control in regions of varying stability and to keep costs competitively low. Development Bonds may be the topic of future work (Development Bond Working Group 2013).

The Impact Bond Framework differs from a bilateral Pay for Success contract by the use of an intermediary that manages the activity of service providers and transfers funds as well as risk from public agencies to investors. We will see that among the various participants, a robust intermediary is the catalyst of current Social Impact Bond projects.

***Social Impact Bond Participants***

A SIB typically includes five participants at the organizational level:

**Investor:** Investors will provide funding in the form of loans, recoverable grants, and donations. Investors may either be repaid a lump sum (loan guarantee) if the project is completed or terminated unsuccessfully, or receive success payments proportional to the savings realized by the participating government department.

**Outcome Payer**: An outcome payer is an entity that benefits from a successful project in the form of real savings. The outcome payer is typically a regional government or public agency.

**Intermediary**: Intermediaries may be local foundations or project coordinating non-profits and usually facilitate interactions between Investors and Payers as well as Service Providers.

**Service Provider**: Service Providers are private companies that specialize in the social or development services needed to complete the project with desirable impacts. They are usually sourced by the intermediary participant and they report to independent validators for performance assessments that measure the impact of their services.

**Independent Validator**: The Independent Validator may comprise an evaluation firm, consultants, and other specialists in the field. The validator confirms the success and impact of the project compared with ex-ante assessments provided by the project intermediaries.

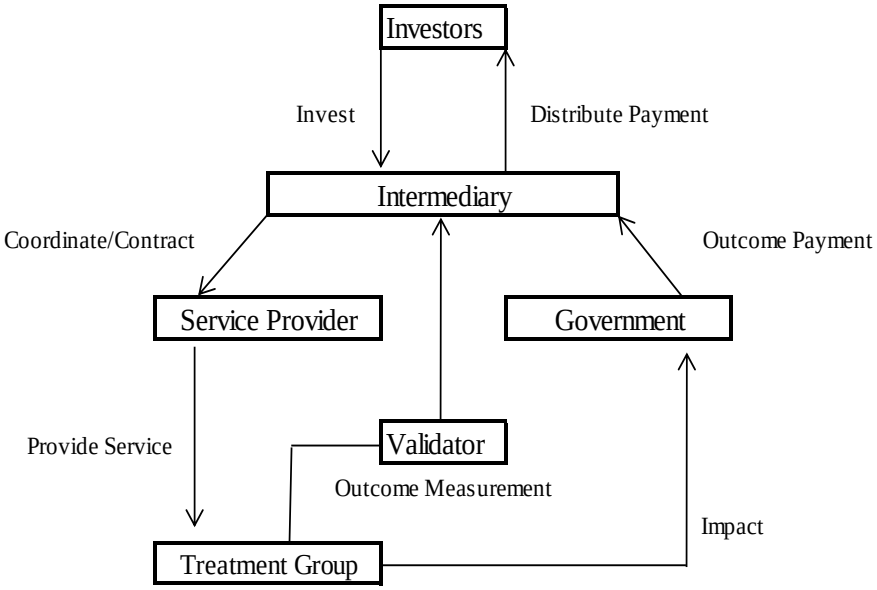



**Figure 1: Structure of an Impact Bond**

A Social Impact Bond may be proposed by any member of the coalition, though it usually requires a coordinating intermediary to structure the project and determine the value and timeframe of project outcomes.

## REVIEW OF LITERATURE AND CURRENT PROJECTS

Social Impact Bonds were devised to guarantee cost-effective and successful solutions to social problems (Horesh 2000). The emergence of this financing scheme poses an alternative to the standard model of public financing. In general, the public sector funds social projects based on the input of services, and in many cases the outcomes of projects are not rigorously assessed (Liebman 2011). Local governments are without the self-interest to command efficiency through profit-seeking, as their purpose is to develop regional policy in the best interest of the public, but the structure of a Social Impact Bond offers a timely alternative by combining the self-interest of the private sector with social benefit oriented impact-based financing (Horesh 2000). By attracting commercial investors and providing performance-based payments, the public sector may be able to access the capital markets in a socially responsible contract.

Local governments may consider Social Impact Bonds particularly feasible in the context of current budget stress, but do shortcomings in regional public policy necessitate this alternative solution? There is an important duplicity about Social Impact bonds in their current form that is worth mentioning here: At a time of unprecedented municipal budget stress (Warner 2012) governments would seek to improve social welfare with preventative service projects that are expressly aimed at reducing government expenses. It's not simply that social impact must be monetized for the sake of repaying private investors, but the idea that preventative projects measure impacts over a relatively short amount of time and claim regional social

benefit in the absence of spatial outcome measurements in order to define financial value. This has been described as the mobilization of public policy for financial profitability (Lake 2014) and indeed that is the way it appears, especially in early SIB projects with a tenuous connection to long-term social welfare. We will see that SIBs require an inordinate amount of work to estimate and communicate a relatively static impact on social welfare but allow potentially substantial transfer of government savings.

***How will SIBs Proliferate?***

In order for Social Impact Bonds to deliver benefits to society, the public-private cooperative environment must be such that impact assessments are reliably conducted and information flows easily between service providers, government, and investors; furthermore, pay-for success contracts must have ubiquitous recognition from local and federal authorities. The structure of Impact Bonds is a relatively new approach to social services that will require regional government as well as federal support to develop an environment that facilitates their implementation (Joseph 2013).

As a social financial innovation, Social Impact Bonds will also demand regional capacity-building to facilitate their sustained use in the United States. Government agencies should be able to structure effective pay-for-success contracts and retain a neutral regulatory authority, independent of contract participants, prepared to validate impact assessments and outcomes as well as mediate disputes. Most importantly, an intermediary with the ability to understand and perform the

contracting tasks as well as manage service delivery will be the interface between government, investors, and service providers (Liebman 2011).

Given adequate capacity for their use, the structure of a Social Impact Bond may resolve a number of barriers to innovation in preventative social service financing (Shiller 2013). The rigorous impact assessments required to initiate the SIB model followed by ex-post outcome evaluations could provide information useful for determining success and scaling up successful projects in the future; some projects aim to scale treatments, such as the Fresno Asthma PFS Demonstration Project, others are committed from inception to a treatment group and a set of predefined outcomes and success payments. Success-based payments, in conjunction with impact assessments, may reduce public officials' concern about launching promising yet unproven SIB project arrangements while necessitating a comprehensive outline of expected social and monetary value of each project, albeit lacking any consideration of spillovers. In its current form the valuation method and financing mechanism has gained considerable attention in government, motivating support at the federal level to help spur the development of a number of Social Impact Bond pilot programs in the United States.

***Support from the Federal Government***

There has been a significant amount of support for Pay for Success projects in the United States from the federal government in the executive branch. President Obama's budget for financial year 2014 included a request for a $300 million one-time mandatory appropriation to form a new Incentive Fund to help state and local

governments implement PFS programs (Federal Register 2013). The fund, which will be managed by the Treasury Department, is collecting information about performance-based funding mechanisms that would inform the grant assistance program and encourage additional support in the future. The request for information is called "Strategies to Accelerate the Testing and Adoption of Pay for Success (PFS) Financing Model" (Ibid).

The Disaster Relief Appropriations Act of 2013 made available $16 billion in Community Development Grant funds for necessary expenses related to disaster relief due to Hurricane Sandy. The Department of Housing and Urban Development (2013) encourages grantees to leverage grant funds with public private partnerships and the department expressly notes the use of "success based strategies, including social impact bonds…"

In 2013 the Department of Labor provided nearly $24 million in grants to pilot Pay for Success initiatives in New York and Massachusetts. Through the Workforce Innovation Fund, New York State received $12 million and Massachusetts received $11.67 million in grants to support SIBs that increase employment and reduce recidivism among at-risk populations. The Department of Labor grants will help fund the Pay for Success component of those agreements (Department of Labor 2013).

In 2012, under the federal Second Chance Act the Department of Justice's Bureau of Justice Assistance (BJA) made two pay for success awards totaling $800,000. The awards support jurisdictions which propose to plan or implement a Pay for Success project into their social service initiatives; including an implementation

award to Cuyahoga County, Ohio and a planning award to Lowell, Massachusetts, both allocated for prisoner reentry initiatives. In addition, the BJA is funding the Urban Institute's efforts to develop a blueprint for municipal, state, and federal governments to use pay for evidence-based anti-crime programs. (Department of Justice 2012)

The support from federal agencies is promoting regional implementation of the social impact bond financing scheme. I outline a few examples of the more current projects at the state and municipal level below.

***Examples of Regional Implementation***

Due in part to the new trend of support from the federal government, state legislatures across the country are initiating pay for success policy and preparing to support Social Impact Bond projects in the near future. Some regional governments have already launched Social Impact Bond projects or pilot programs with the cooperation of municipal governments. A selection of active projects follows.

*The Rikers Island Social Impact Bond*

New York City

The Rikers Island Social Impact Bond is designed to support cognitive behavioral therapy services for 16- to 18-year-olds incarcerated at Rikers Island jail (Rudd et al. 2013). The up-front loan financing will be repaid with the actual and projected cost savings realized by the New York City government. Success payments are calculated based on the project's impactful outcomes as a result of the expected decrease in recidivism rates at Rikers Island.

The success payments are based on savings from the Department of Correction's (DOC) permanent reduction of jail beds operated on any day (Rudd et al. 2013); that is, the operating costs of holding 100 less inmates on any given day will save the DOC a measurable amount of money. Tiers of payments correspond to each percent reduction in future days in jail estimated with information from the NYC Office of Management and Budget and the DOC. Ultimately, the success payments are based on an impact assessment conducted by the SIB's Intermediary, MDRC, in concert with the New York City government and service providers.

MDRC is a nonprofit, nonpartisan education and social policy research organization that designs intervention and preventative programs as well as conducts analysis of existing programs. As the intermediary of the pay for success agreement, MDRC adapted and finalized contracts with the various partners and oversees the implementation of the program (Rudd et al. 2013). Their role in operating a successful program at Rikers Island includes monitoring the service provider, receiving success payments from the Department of Correction and transferring payments to the lender. The Urban Investment Group at Goldman Sachs is the primary investor and lender in the NYC SIB. The Urban Investment Group provided a $9.6 million loan to MDRC to fund the project over four years (Olson and Phillips 2013). This loan is guaranteed by a grant of $7.2 million dollars from Bloomberg Philanthropies that will compensate the investor for a portion of the loan in case of project failure. Goldman Sachs Urban Investment Group officially announced the SIB in August 2012, and the project is expected to last four years.

**Table 1: Rikers Island Social Impact Bond**

| Rikers Island Social Impact Bond (Selected Participants) | |
|---|---|
| Organization | Role |
| New York City Department of Correction | Outcome Payer |
| Goldman Sachs | Investor |
| Bloomberg Philanthropies | Investor |
| MDRC | Intermediary |
| Vera Institute of Justice | Service Provider |
| Osborne Association | Independent Validator |

*Juvenile Justice Pay for Success Initiative*

Commonwealth of Massachusetts

The Massachusetts Juvenile Justice Pay for Success Initiative will fund an intervention program for nearly one thousand men aged 17 to 23 who are transitioning out of the juvenile justice system or are currently in a probation program (The Commonwealth of Massachusetts 2014). The services provided to these young men include life skills development, education and employment programming. The outcome of these services is expected to reduce recidivism and increase employment in this at-risk population.

The Commonwealth of Massachusetts will determine the success of the program based on the reduction in the number of days the young men spend in jail after participating in the program. In addition, the intervention model is expected to improve job readiness of participants; results based on these impacts will also be considered in the estimation of success payments. For the seven-year project, the Commonwealth has committed $27 million for the repayment of funding and has received a PFS grant from the Department of Labor to continue the project if it is successful (Ibid).

Third Sector Capital Partners is serving as the project intermediary for the juvenile justice initiative. Third Sector secured $12 million in private loan financing as well as an additional $6 million in grants. With pro bono legal assistance, the nonprofit advisory services firm worked with the government, investors, and service providers to launch the project.

The financing for the PFS project in Massachusetts is different from the New York City SIB in that it does not utilize a guaranteed loan structure. The Goldman Sachs Urban Investment Group provided $9 million and along with The Kresge Foundation and Living Cities delivered a total $12 million loan amount. Grant funding from a collection of philanthropic organizations, including the Laura and John Arnold Foundation, New Profit, and The Boston Foundation, is an at-risk investment along with the loan amount for the seven-year project. The nonprofit grantors are considered "concessionary investors" and will likely accept a lower return which helps attract investors seeking a higher rate of return (Brest and Born 2013).

**Table 2: Massachusetts Juvenile Justice Pay for Success Initiative**

| Massachusetts Juvenile Justice Pay for Success Initiative (Selected Participants) | |
|---|---|
| Organization | Role |
| Commonwealth of Massachusetts | Outcome Payer |
| Goldman Sachs | Investor |
| Living Cities and the Kresge Foundation | Investor |
| Laura and John Arnold Foundation | Investor |
| New Profit and The Boston Foundation | Investor |
| Third Sector Capital Partners, Inc. | Intermediary |
| Roca, Inc. | Service Provider |

*Fresno Asthma PFS Demonstration Project*

Fresno, California

The Asthma Pay for success project aims to improve the health of low-income children with asthma. The project impacts will be measured by the reduction of emergency asthma related treatments in Fresno, CA and success payments will be dependent on insurance claims data from the treatment group (Social Finance 2013).

Social Finance U.S., the project intermediary and manager, received a grant from the California Endowment to support the launch of the preventative demonstration project in spring 2013. By demonstrating the benefit of the asthma management services, Social Finance aims to show the advantage of preventative programs in healthcare. The goal is to develop the demonstration program into the first Social Impact Bond in California as well as the first healthcare related pay for success agreement in the United States. Social Finance will guide the development of an advisory group which will work to design the SIB that would eventually scale up the program.

The California Endowment (TCE) made a grant in the amount of $660,000 to support the demonstration project; the funding directly supports the operations of Social Finance U.S. and the independent validator, Collective Health (Brush 2013). The asthma reduction project is within the scope of expertise of TCE, a statewide health foundation, and a suitable candidate project to receive preventative services. By selecting a health related project in one locale, TCE is best able to measure the success

of the demonstration project and assess the likelihood of continuation in preventative social investing for such applications.

**Table 3: Fresno Asthma Pay for Success Project**

| Fresno Asthma Pay for Success Project (Selected Participants) | |
|---|---|
| Organization | Role |
| The California Endowment | Investor |
| Social Finance | Intermediary |
| Central California Asthma Collaborative | Service Provider |
| Clinica Sierra | Service Provider |
| Collective Health | Independent Validator |

### *The Utah High Quality Preschool Program*

Granite School District, Utah

The Utah High Quality Preschool Program includes a curriculum designed to increase school readiness and academic performance among 3 and 4 year olds. As a result of entering kindergarten better prepared the expectation is that fewer students will use special education and remedial services in kindergarten through 12$^{th}$ grade. Success payments will be derived from cost savings for school districts and the State of Utah.

Both the Granite School District and the Park City School District will incorporate the program into their curriculum. Each school district receives an annual payment from the State of Utah of $2600 per student to provide special education and remedial services; the goal is to save this amount by providing the preschool program which should better prepare students to perform through the 6$^{th}$ grade with minimal special education assistance. The savings will initially be used to make success payments and subsequently may be captured by the state and school districts (Voices for Utah Children 2013).

United Way of Salt Lake (UWSL) will act as intermediary for the project. UWSL is a charitable organization pledged to the development of healthy communities and equal access to education. They will oversee the implementation of the preschool program and manage repayment to the private investors.

Goldman Sachs will provide up to $4.6 million to fund the program with additional support from the J.B. Pritzker Foundation in the form of a subordinate loan of up to $2.4 million (Goldman Sachs 2013). The first $1million investment will enable approximately 500 children to attend the pre-school program and subsequent investments will be made on the basis of successful implementation and impact. The success of the project will be measured based on the actual avoided costs realized by the State of Utah through its contributions to the school districts and is dependent on the performance of the treatment group as they progress through 6th grade.

**Table 4: Utah High Quality Preschool Program**

| Utah High Quality Preschool Program (Selected Participants) | |
|---|---|
| Organization | Role |
| Granite School District | Outcome Payer |
| Park City School District | Outcome Payer |
| Goldman Sachs | Investor |
| J.B. Pritzker Foundation | Investor |
| United Way of Salt Lake | Intermediary |

The examples of Social Impact Bonds introduced above vary in application and investment mix but are similar in structure. They all require a government component, investors, and an intermediary organization. The intermediary role is of particular interest and explored further in this paper.

# METHODS

## *Tools for Analysis and Discussion*

A few questions that must be addressed before Impact Bonds become prevalent in the United States are the following:

- What aspects of an Impact Bond make it an effective mechanism for social service finance and savings to regional governments?
- How does the structure of an Impact Bond communicate value to investors?
- Will the performance of these projects be visible or easily measurable by potential investors and the public?

I approach these questions by unpacking three points of discussion about Impact Bonds. First, I elaborate on the Investor's perception of risk and value by estimating the real option that is embedded in the New York City Rikers Island SIB. Next, I discuss the value-added by the intermediaries by outlining a comparison between alternative financing schemes. In addition, I suggest the importance of intermediary identification by the Investor and the efficiency that private investors may bring to the Impact Bond agreement. Overall, the analysis and discussion will be an exploration of the implicit value of Impact Bonds and how it is extrapolated by impact assessments and communicated to investors by the Intermediary.

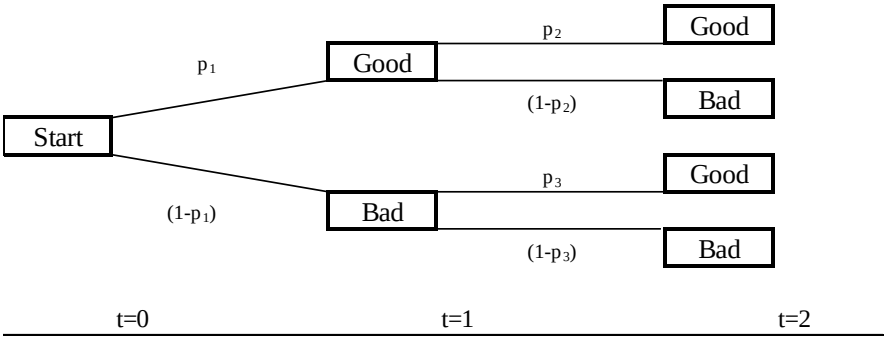
## *Valuing Options in an Impact Bond Agreement*

An essential consideration in evaluating a Social Impact Bond is the transfer of risk and the participation of investors, taking into account how the SIB agreement may attract up-front investment to launch a project. An intermediary may negotiate project

budgeting options with the investor, like the option to continue funding a project, in order to add additional perceived value to the project investment. Real options are a useful tool for valuing the opportunity to make investment decisions during the development of a project (Damodaran 2012). I show how they add value to ensure investment in an otherwise nonviable financing arrangement in the Rikers Island SIB.

By applying financial option theory to investment decisions, one may gain some insight about the viability of a project proposal. The binomial real option pricing method is an intuitive way to present both the current value of a future decision opportunity (option) and the underlying value of the agreement as a whole.

The real option value is derived from a binomial lattice, a type of discrete simulation of the Brownian Motion stochastic process that is used to value financial options (Mun 2002). The familiar discounted cash flow of the underlying project can be seen as a special case of a real options model when cash flows are dependable and volatility is low (Ibid). Taking into account both the value of discounted cash flows and the real option embedded in a pay for success contract will provide a complete representation of value as it is commonly perceived by the Investor.

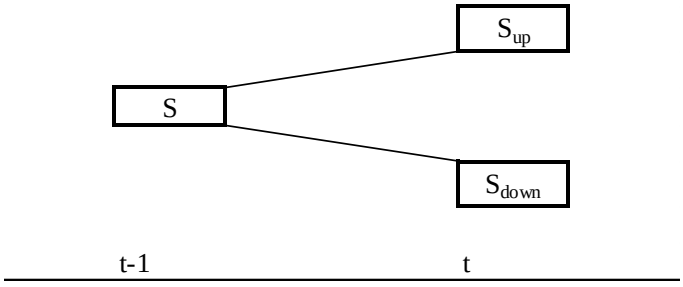



The Binomial Lattice

**Figure 2: The Binomial Lattice**

The binomial real option value is calculated in two steps: The calculation of the present value of the underlying project and the calculation of the lattice evolution of the option shown above. The lattice values are calculated through backward induction, beginning with the terminal node followed by previous nodes; for instance, using the following equation to calculate the value of *S* from $S_{up}$ and $S_{down}$ , from time *t* to *t-1*.

$$[(p)S_{up} + (1-p)S_{down}]\exp[(-rate)(t)]$$




Backward Induction

**Figure 3: Backward Induction**

To simulate the stochastic process, an *up* step is represented by the term $e^{\sigma\sqrt{\delta t}}$ , and the down step is its reciprocal $e^{-\sigma\sqrt{\delta t}}$, where σ is the volatility of the logarithmic

cash flow. The probability *p* can be calculated for each step using the equation in below, where *b* is the continuous dividend payout and σ is a volatility component

$$u = e^{\sigma\sqrt{\delta t}} \text{ and } d = e^{-\sigma\sqrt{\delta t}} = \frac{1}{u}$$

$$p = \frac{e^{(rf-b)(\delta t)} - d}{u - d}$$

The risk neutral probability *p* is used to value the real option in a risk-neutral world; hence, the discount rate used is the risk-free rate *rf* (Mun, 2002).

The value of the real option is the value of the up and down step considering the cost of achieving each step, the strike price K; that is, $\max[S_u - K, 0]$ discounted to time zero. The combined value of the real option and the present value of expected cash flows compared to the investment cost will either encourage investment in the project or result in no investment.

As with many practical examples of real options my case analysis of the New York City Social Impact Bond has some information limitations. The probability *p* is not the result of a stochastic process, instead it is derived from the social impact assessment. The volatility component is assumed to be taken into account in the impact assessment probabilities and there are no dividend payments. The standard real option and NPV equations are used for the case analysis.

$$S = \frac{p_u(S_u - K) + p_d(S_d - K)}{(1 + rf)^t}$$

$$NPV = -Investment + \sum_{t=1}^{n} \frac{payment_t}{(1 + rate)^t}$$

### *Relative Payoffs and the Probability of Success*

The initial Social Impact Bond projects feature a mix of philanthropic investors and commercial investors. In general, it is assumed that the philanthropic investors' priority is social impact and this will typically accept a below market rate of return (Parthenon Group 2013). The NYC SIB includes grant financing as a guarantee that will remain with the intermediary to fund future projects (Rudd et al. 2013). Philanthropic investment plays an important role in early SIB projects because it allows commercial investors to earn a greater rate of return or greater portion of success payments; in exchange, the commercial investment leverages the philanthropic investments to achieve a greater magnitude of social impact.

In order to better understand the Pay for Success contract and its role in defining incentives in a Social Impact Bond agreement, I continue the discussion of value and structure relative to that of standard financing arrangements. This will introduce how an Impact Bond may produce greater total value than alternative financing while delivering at least the same impact. This can be done by defining value and payoffs in an Impact Bond Contract and showing that participants have the incentive to maximize monetary and social value (Pauly and Swanson 2013). Moreover, we can identify characteristics of the Intermediary's influence that improve the efficacy of the project and increase overall value by improving the probability of success and transferring risk.

# ANALYSIS

## *Structure of the Rikers Island SIB Agreement*

After earning a government contract an intermediary's next challenge is developing a compelling assessment of the project value and communicating that value to garner up-front investment. This involves negotiations with investors about the perceived risks associated with the project and a viable financing contract.

Risk in investments is often hedged by financial options. In the case of an Impact Bond, real options may assist in brokering successful financing agreements. I show that an essential amount of value to the commercial investor is derived from real options built into the value structure of the Rikers Island SIB. First, it will be useful to understand the flow of funds and the success payment structure.

In the Rikers Island SIB, transaction costs related to the intermediary were not deducted from the $9.6 million investment. I will make no attempt to estimate the transaction costs in this analysis; however, as standards for SIB valuation are developed transaction costs are expected to be of great importance.

The flow of funds structure of the Rikers Island Social Impact Bond is depicted in Figure 4.

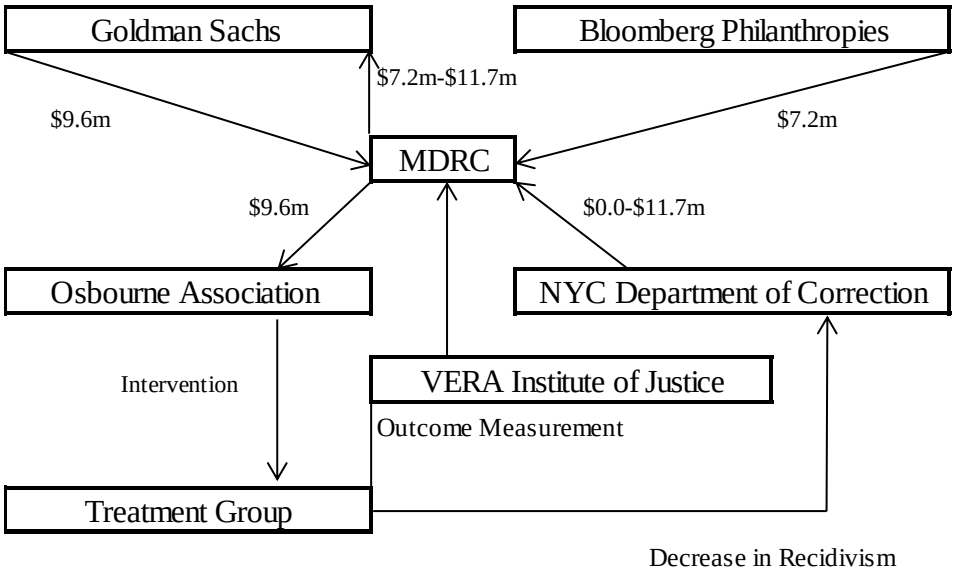



**Figure 4: Rikers Island Social Impact Bond**

The bond is in fact a loan; in this case, the loan provided by Goldman Sachs to MDRC is guaranteed by a grant from Bloomberg Philanthropies. MDRC is the Intermediary and acts as the manager of both the financing and service agreements. The New York City Department of Correction is the Government representative in the contract and will provide success payments to MDRC based on impact measurements in the event of a successful project. MDRC will then distribute the payments to Goldman Sachs as repayment of the $9.6 million loan.

The network of contract signatories may be distilled to the relationship between three core participants: The Investor, the Government, and the Intermediary. The Investor may be defined as the financing instrument most similar to the basket of investors and grantors; in this case, the Investor represents a guaranteed loan ($9.6 million guaranteed by a $7.2 million grant). The Government will refund the loan

when the project has success at pre-defined intervals. The agreed upon intervals allow the possibility of payment after year three, and after year four (Fig. 7), and each payment is dependent on sustained impact over the project horizon. The Intermediary is responsible for identifying and sub-contracting the service provider as well as arranging most of the primary contract even before investment in the project is solicited. I focus here on the financing component of the SIB and the payment schedule.

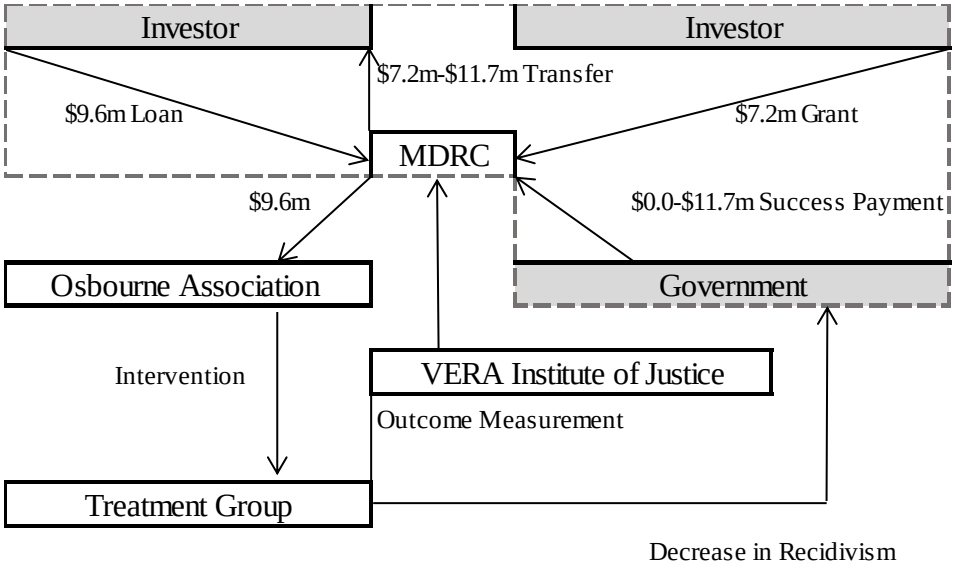



**Figure 5: Rikers Island SIB Financing Component**

With the relationship between the Investor, Government, and Intermediary in mind, I submit that the unique characteristic of an Impact Bond is the ability of the Intermediary to negotiate terms of investment and work to communicate value to the investors preceding the launch of the project. This is not done solely by influencing high-quality service implementation but also by ensuring that the structure of the agreement is such that it provides the incentives or signals necessary to attract

investment from the private sector. The success of the Impact Bond framework may depend on the ability of investors to identify high-quality projects confidently with minimal attention to the ex-ante impact assessment. This is likely to rely on intermediaries that construct valuable preventative service agreements and communicate that value effectively to investors.

The Intermediary is integral to the development of an impact assessment from which the expected value of success payments may be inferred. The government works with the intermediary to clearly define the method it will use to value impact-based payments, based on which the investor may be given options for termination or continuation of investment at predefined stages in the project. The balancing of these terms and timetables will define the risk profile and determine the behavior of the Investor over the course of the project.

In the New York City SIB, MDRC worked with private organizations that have experience in behavioral therapy in order to calculate the probability of a range of impacts based on the participation rate of inmates in the preventative service program (Rudd et al. 2013). The goal of the project is to reduce the number of jail beds operated on any day by more than 100. If the DOC can meet or exceed this reduction it would be able to close a housing area, resulting in an expected savings of $28,000 per jail bed (Rudd et al. 2013). This information was combined with the impact data from the City and used by MDRC to communicate success expectations and provide a repayment schedule for the Investor.

The net projected taxpayer savings attributed to recidivism reduction rates are shown in Table 5. There is limited information available about the valuation of these savings and they do not take into account all externalities of the reduction in recidivism rate, but they do serve as useful references for this analysis.

**Table 5: Projected Savings**

| | Projected Savings | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Recidivism Reduction Rate | ≥8.5% | ≥10% | ≥11% | ≥12% | ≥12.5% | ≥13% | ≥16% | ≥20% |
| Net Projected Taxpayer Savings ($) | <1,000,000 | <1,000,000 | 1,700,000 | 5,600,000 | 6,400,000 | 7,200,000 | 11,700,000 | 20,500,000 |

Source: Adapted from Rudd et al. 2013

Figure 6 shows a timeline of project development and below, in Figure 7, is a decision tree depicting the evolution of success payments. Figure 6 illustrates the timing of various decisions related to the involvement of investors, actions taken by MDRC, and the timing of progress evaluations. Figure 7 illustrates how the progress evaluations affect the success payment over the four year project. At the end of year three, 2015, there is a decision point for the investor and an opportunity to continue funding the project. The decision point in year three and final success payments are contingent on successful achievement of a 9% and 8.5% impact respectively. These impact hurdle rates are meant to achieve taxpayer savings based on the values in Table 5. We will see that the option to continue the project after year three also contributes value to the financing assessment of the project.

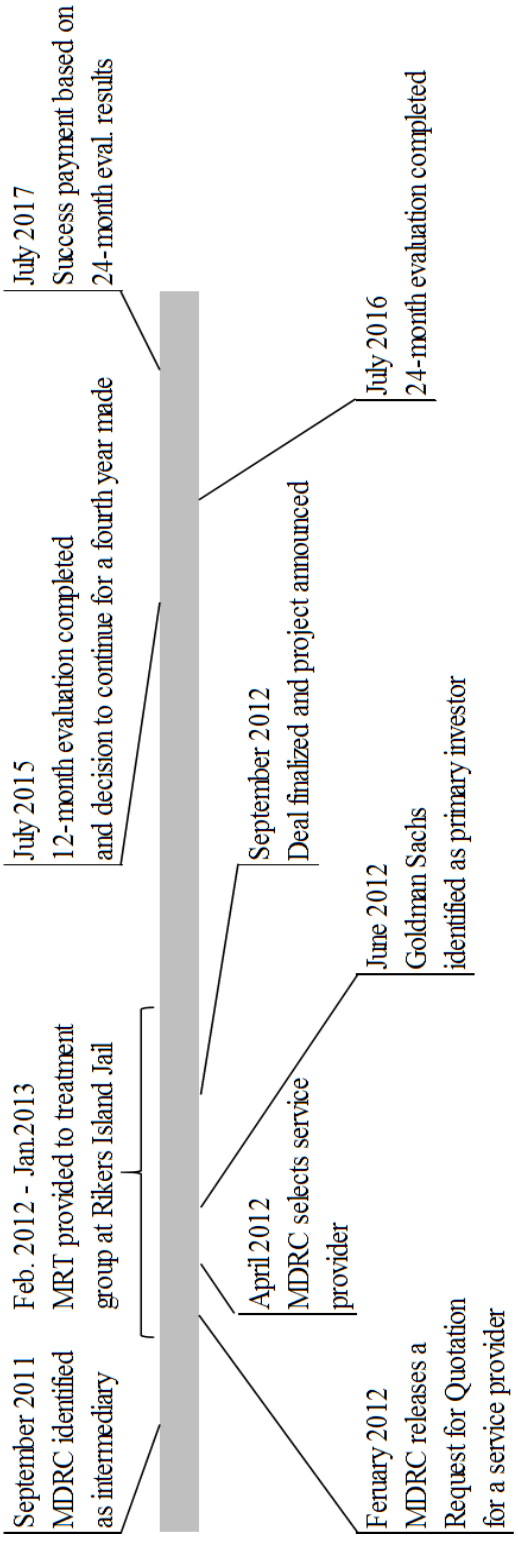



**Figure 6: Project Timeline for the New York City Social Impact Bond**
Source: Rudd et al. 2013

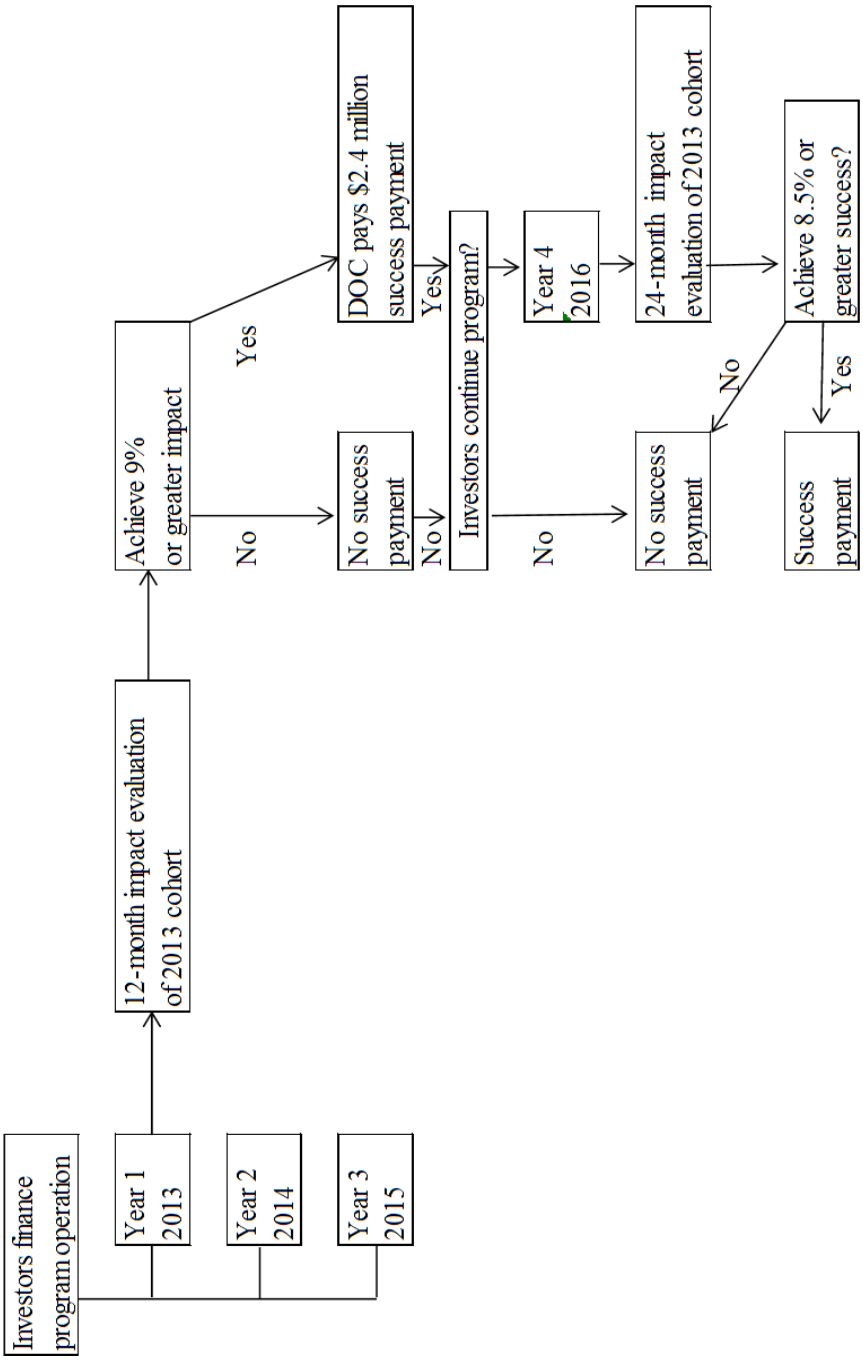



**Figure 7: Investment and Payback in the New York City Social Impact Bond**
Source: Rudd et al. 2013

### *Impact and Success Payments*

I will provide an overview of the measurements and payment values used by MDRC based only on the impact measurements; therefore, no payment will be prorated based on the number of participants in the treatment group (Rudd, Nicoletti et al. 2013)

In Table 6, I tabulate the expected value of success payments determined by a range of impact values. Column three represents the expected value of success payments assuming that an impact of 9% has been met in year three, the total of which is the expected payoff in year four from the vantage point of a program that has already measured a 9% impact in year three. Consequently, $10.80mm minus the payment in year three and the cost *K* of operating the program in year 4 represents the expected "good" ($S_u$) outcome of the real option lattice.

Table 7 shows the likelihood of each impact level being met based on the rate of participation by inmates. These values, developed specifically for the Rikers Island Social Impact Bond (Rudd et al. 2013), indicate that 33% of the participants are expected to complete 10 or more weeks of the treatment program. The corresponding reduction in recidivism rate (RRR), 25%, represents the expected impact if 100% of participants completed 10 weeks of treatment. Therefore, the percent of population column multiplied by the reduction in recidivism percentages yields a weighted average for each level of completion, the sum of which represents the expected impact of the program overall.

For the sake of comparison, if one takes the 11.35% value from Table 7 and compares it to the first column in table 6, it will show that the expected success payment is

approximately $10.11mm. The difference between this amount and the $10.80mm total in the third column of Table 6 is representative of the improved success outlook for a program that already achieved greater than 9% impact by year three. This is illustrative of the value that is often derived from decision making opportunities during a project. Next I will develop an estimation of the project value as it appears to an investor with options.

**Table 6: Expected Value of Success Payment**

Expected Value of Success Payment

| Recidivism Reduction Rate (RRR) | Success Payment ($mm) | Adjusted Probability (RRR > 9%) | Weighted Success Payment ($mm) |
|---|---|---|---|
| 0% | $0.00 | | |
| 8.50% | $4.80 | 3.6% | $0.17 |
| 10.00% | $9.60 | 8.2% | $0.79 |
| 11.00% | $10.08 | 4.5% | $0.46 |
| 12.00% | $10.18 | 5.5% | $0.56 |
| 12.50% | $10.27 | 9.1% | $0.93 |
| 13.00% | $10.37 | 3.6% | $0.38 |
| 16.00% | $10.94 | 20.0% | $2.19 |
| 20.00% | $11.71 | 45.5% | $5.32 |
| 25% | $11.71 | Total | Total |
| | | 100.0% | $10.80 |

**Table 7: Likelihood of Impact Given Levels of Completion**

Likelihood of Impact Given Levels of Completion

| Weeks of Therapy | | Percent of pop. | RRR (%) | Weighted Avg. |
|---|---|---|---|---|
| 10 | Completers | 33% | 25.00 | 8.25 |
| 6-10 | High partial completer | 9.30% | 16.60 | 1.54 |
| 3-6 | Low Partial Completer | 18.80% | 8.30 | 1.56 |
| 3 | Noncompleter | 38.90% | 0.00 | 0.00 |
| | | Total | | |
| | | 100% | | 11.35 |

Source: Rudd et al. 2013

***Value to the Investor***

A common way of measuring the value of investment projects is the Discounted Cash Flow and Net Present Value assessment; however, the method does not evaluate the decisions made during the course of a project and the corresponding uncertainty. Real Options analysis will value such opportunities often built into project financing contracts. It is a method for assessing the value of decisions made in the future, during project development when outcomes may be more easily predicted. Used in combination, the Discounted Cash Flow and Real Option provide a more comprehensive project valuation. I use these methods to show that an option in the Rikers Island SIB may have significantly increased the expected up-front value of the project for investors.

Based on the present value of future cash flows, assuming an estimated cost of capital rate between 7% and 10%, success payment would be between $7.69 and $6.88 million, and given the $9.6 million cost of the project, the net present value would be less than zero. The present values are based on MDRC's expectation of 11% impact and the corresponding success payment $10.08 million at the end of year four. The success payment is then discounted back four years using the opportunity cost of capital (occ) for Goldman Sachs. The range between 7-10% takes into consideration the reduction in risk provided by the loan guarantee which would likely adjust the opportunity cost of capital toward the lower end of the range; thus, $PV = \frac{\$10.08}{(1+.07)^4}$.

The lattice evolution of option value is the present value of the option to continue the project at the end of year three for one additional year. At the end of year

three, the cost *K* to continue the project for the fourth year is the annual loan drawdown amount, $2.4 million, however the additional information at the end of year three may significantly increase the value of the decision to continue the project for the investor by adding additional certainty to the probability of success. The value of this information is represented in monetary terms by the dollar value of the real option.

$$S_{uu,t=4} = \$10.80 - 2(\$2.4)$$

$$S_{ud,t=4} = \$0_{(impact<8.5\%, no\ success\ payment)}$$

$$S_{du,t=4} = \$10.80 - \$2.4$$

$$S_{dd,t=4} = \$0_{(impact<8.5\%, no\ success\ payment)}$$

$$S_{u,t=3} = \frac{0.8(S_{uu,t=4}) + 0.2(S_{ud,t=4})}{(1+0.07)^1}$$

$$S_{d,t=3} = \frac{0.6(S_{du,t=4}) + 0.4(S_{dd,t=4})}{(1+0.07)^1}$$

$$S_{t=0} = \frac{0.5(S_{u,t=3}) + 0.5(S_{d,t=3})}{(1+0.07)^3}$$

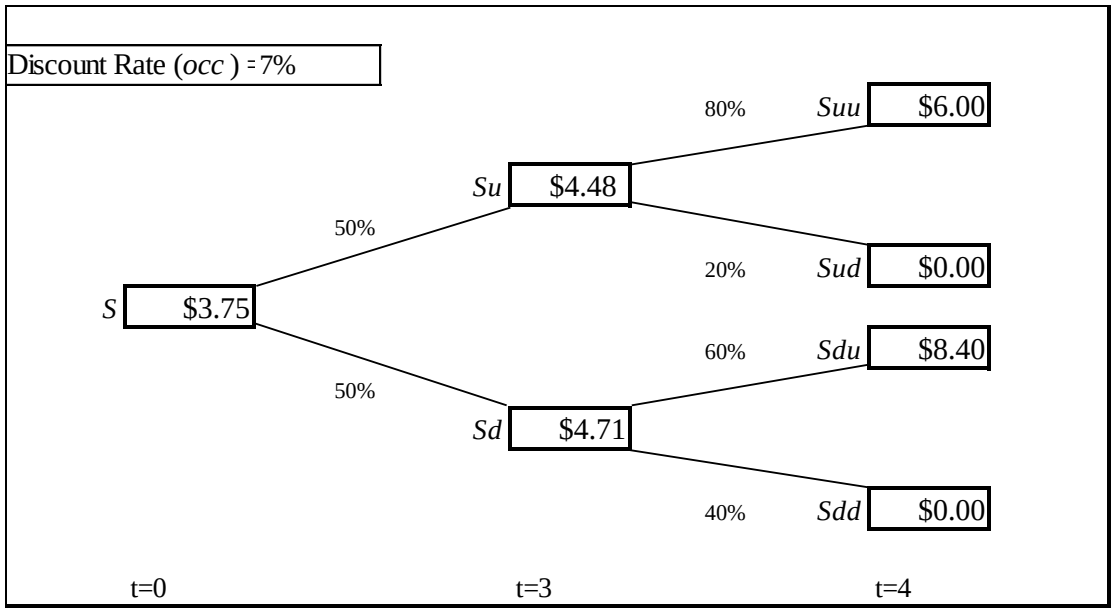



**Figure 8: Lattice Evolution of the Real Option**

Added to the present value of future cash flows, the total value represents the present value of the project to the investor with the option embedded resulting in the Real Option Strategic Net Present Value. The investor then expects to receive net value of $1.84 million for the project investment using the 7% discount rate.

$$RO\ Strategic\ NPV = -\$9.6 + \left[\frac{\$10.08}{(1+0.07)^4} + S_{t=0}\right]$$

$$= \$1.84$$

The probability of each step is approximated from impact likelihood. For the first three years the project is considered especially risky due in part to the lag in impact assessment results of each cohort as well as the inherent risk associated with

the relatively new project model. The assumption I use assigns a 50% chance that the project will succeed to the point of being eligible for success payments by the end of year three. Subsequent legs from year three to year four represent probabilities that approximate the likelihood of at least remaining above the benchmark impact (8.5%) in order to receive a success payment by the end of year four, given the state of progress in year three. These probabilities may fluctuate for a number of eventualities related to the impact assessment and management of the program. Thorough analysis of the impact assessment is beyond the scope of this paper, it is available to the public in limited form through Rudd et al. 2013. I will, however, discuss the sensitivity to discount rates in the context success payment valuation.

***Summary of Project Value***

Two variables improve the risk profile across the four-year investment for Goldman Sachs: the loan guarantee and the real option. The grant from Bloomberg Philanthropies guarantees the loan for the cost of operation in the first three years of the program. This guarantee reduces the opportunity cost of capital for Goldman Sachs by providing payment certainty for up to $7.2 million of the up-front investment. This is the reason for using a relatively low cost of capital.

Additional value added to the project is the option to continue the project at the end of year three for a fourth year. The real option, valued at $3.75 million, would allow Goldman Sachs to make an investment decision with significantly more information about the success of the treatment and the likelihood of overall success of the project. At the time Goldman Sachs would have the opportunity to exercise the

real option and continue the project for a fourth year, there would be sufficient information available to estimate more accurately or develop confidence about the degree of impact and the corresponding expected success payment. With knowledge of the exact price of continuing the project in year four, the investor in this case can evaluate the real option and combine it with the present value of expected cash flows to produce an augmented project valuation that incorporates uncertain cash flow. In the example above, the augmented project valuation is great enough to justify the risk of an up-front investment in the SIB. The valuation, like any calculation that incorporates the time value of money, may be particularly sensitive to changes in the investors' opportunity cost of capital.

A sensitivity analysis for the discount rate is tabulated below in Table 8. The range of viable discount rates is bound by the payment cap of $11.7mm, stipulated in the schedule of success payments for the Rikers Island SIB, and the discount rate at which the investor expects no gain and estimates a negative NPV. This highlights the importance of structuring the payment schedule so that it communicates value to investors, taking into consideration their perception of risk and opportunity cost while maintaining a realistic estimate of the project outcomes.

**Table 8: Sensitivity to Discount Rate**

Sensitivity to Discount Rate

| Discount Rate | 6% | 7% | 8% | 9% | 10% | 11% | 12% | |
|---|---|---|---|---|---|---|---|---|
| Real Option Strategic PV($mm) | 11.88 | 11.44 | 11.02 | 10.62 | 10.24 | 9.88 | 9.53 | |
| Rate of Return | 23.74% | 19.18% | 14.83% | 10.67% | 6.70% | 2.91% | -0.72% | |
| | Pmt. Cap | Range of Viability | | | | | No Gain | |

Regional variation in the discount rate could significantly impact the likelihood of up-front investment. That is, variations in an investor's perception of the riskiness of project development in various regions may affect the likelihood of launching a local Social Impact Bond. Moreover, regions with higher economic instability and likely a greater need for preventative social services may be considered too risky and unfit for investment.

In order to maximize estimated success payments in relatively risky regions, there must be a robust analysis of direct government savings associated with the project as well as the inclusion of positive economic spillovers *within the government's jurisdiction*. Intermediaries and governments operating in areas without the ability to realize compelling direct savings may overestimate the value of spillovers and incorporate that value into the schedule of success payments. Measuring externalities such as improvement in employment, reduction in crime rate, and improvement in educational performance would likely give the true social value of the project but may not necessarily contribute to the savings of a local government and therefore could not be included in success payments with confidence. When spatial economic boundaries affect the ability to capture savings from preventative social services it presents additional uncertainty for governments, risk for investors, and a greater responsibility for intermediaries to balance the need for investment with realistic expectations for social benefits that transpire within spatio-economic boundaries.

### *Influence of the Intermediary in SIB Projects*

The real option framework and project valuation is useful for understanding one aspect of the risk transfer mechanisms that assist in launching a SIB project. There must also be significant confidence about the ability of the intermediary to manage the project effectively and sustain the probability of success. In financing projects that involve socially conscious investors it has typically been the participation of a philanthropist on the board of advisors that may influence the probability of success (Porter et al. 2002). This has assisted in their dominance over projects that are entirely dependent on commercial investors.

The value added to Social Impact Bond agreements can be shown to be related to an amount of effort or influence affecting the probability of success (Pauly and Swanson 2013). It is intuitive to expect that philanthropists may work to influence the success of the projects in which they invest and this has proven to be the case in conventional philanthropic investment projects (Porter et al. 2002). Philanthropists may have expertise that can contribute positively to the probability of success based on the pursuit of social value while adding no additional cost to the project, but the capital contribution from a philanthropist is rarely sufficient to fund a project on its own.

Philanthropic participation leveraged by commercial investment has been described as one competitive advantage for Social Impact Bonds over other debt financing and strictly philanthropic financing agreements (Hughes and Sherer 2014). Pauly and Swanson (2013) develop a framework in which they show the dominance of

the leveraged philanthropic investment over standard pure-debt, and further show the SIB model over the former financing mechanisms by introducing the probability of success as a function of the effort contributed by a philanthropic entrepreneur seeking both a return on investment and social value.

Building on the idea that effort by an influential entity contributes to the probability of success, the estimates of generalized SIB projects should include an intermediary agent that seeks some social value plus outcome payoff to continue to operate the program; having a greater incentive and ability to maximize the success of the project than a philanthropist investor.

Based on their comprehensive involvement in the delivery of social outcomes, intermediaries will develop a reputation for their ability to manage successful projects, earn government PFS contracts, and structure SIBs that recoup and reward up-front investment. While the effort-dependent conceptual framework is expected to include intermediaries, it should then be adapted to include the effect of risk transfer and transaction costs on project value as well. The inclusion of these factors are considered paramount to measuring the viability of public-private partnerships (Bing et al. 2005) and will hopefully draw attention to intermediaries and their role in financial innovation (Gorton 2008) in the context of Social Impact Bonds.

# CONCLUSION

Intermediaries have two invaluable effects on the overall value of Social Impact Bond projects.

- The intermediary assists in structuring and settling the financing agreements, *mitigating financial risk* for the government and investors.
- The intermediary is responsible for the management of contracts and services and is in a unique position to *influence the success* of a project.

The combination of these effects will facilitate success in securing up-front investment and reducing uncertainty in project outcomes.

The value that an intermediary adds to pay for success contracts and implementation processes could eventually be a measure of project success in itself. Investors may then use the reputation of intermediaries to assess project value and to motivate initial investment instead of scrutinizing the structure and treatment of the preventative service project. The effect of such behavior could streamline the investment process and increase the public sector's access to private capital for preventative social programs, but varying availability of qualified intermediaries around the country may preclude some regions from developing SIB projects.

What is more, the intermediary may serve an important role in future securitization of Social Impact Bonds. The structure of a SIB and an intermediary's involvement in most aspects of the project may transition investors' value assessment of the whole project to evaluating the acumen of the intermediary in familiar terms, by selecting the payment maximizing intermediary best able to mitigate financial risk.

This may also maximize social outcomes assuming that impact assessments are thorough and an accurate measure of social value.

As shown in the real option analysis above, project financing agreements are resource intensive and complex – investors are likely to seek lower risk through liquidity by encouraging a market for SIB-backed securities. To this end, there has been some discussion about the value of securitizing impact-based guarantees, the price of which would reflect information about the social benefit output of an intermediary (Chowdhry et al. 2013). This trend toward the financialization of social services poses four important questions that may be the topic of future research:

- Will preventative treatment in urban areas reduce the support of social services across broader regions?
- Could the securitization of preventative treatment projects imprudently expose markets to governments that may not be able to honor payment commitments?
- How will the involvement of financial institutions in social services undermine urban public policy in the long term?
- Could bundling and securitization of Social Impact Bond projects by a few intermediaries circumvent the transaction costs associated with localized intermediaries? Would this in effect standardize the valuation of impacts and disregard regional variations in the ability to capture savings?

Social Impact Bonds for preventative services could prove to be a useful innovation in regional public finance; however, such circuits of value can be considered exploitative in nature (Lapavitsas 2009) and should be rigorously evaluated

before SIBs are widely implemented. Going forward, it will be important for intermediaries to be localized in their regional scope of operation and focused in their service expertise. While the communication of social impact through securitization is an interesting and perhaps a promising route toward prevalent SIB use, there must first be public policy initiatives to support the regionalization of SIB activity as well as standards to mitigate sequestration of public money and the concentration of investment in a limited set of preventative applications. Furthermore, success payments should be derived from a combination of service related savings and regional attributes that may affect the local retention of savings. Otherwise, the use of Social Impact Bonds may lead to further accumulation of capital toward financial hubs at the expense of the social goods they aim to enhance.

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